TABLE OF CONTENTS

SEC	TION	AGE
Lis	of Acronyms P	·viii
Pre	ace	
	CONTINUING WORK EFFORTS	'-11
	CHANGES IN THE WATER USE EFFICIENCY PROGRAM	'-14
1.	Introduction	
	1.2 WATER USE EFFICIENCY IN THE BAY-DELTA SYSTEM TODAY	1-4
	1.3 BASIS FOR A CALFED WATER USE EFFICIENCY PROGRAM	1-5
	1.4 SUMMARY OF POTENTIAL WATER CONSERVATION AND RECYCLING	1-5
	1.5 VARIATION IN CONSERVATION ESTIMATES	l-11
2.	Water Use Efficiency Program Description	
	2.2 PROGRAM APPROACH 2.2.1 Agricultural Water Use Efficiency Approach 2.2.2 Urban Water Use Efficiency Approach 2.2.3 Managed Wetlands Water Approach 2.2.4 Water Recycling Approach	2-3 2-6 2-9
	2.3 IMPLEMENTATION 2.3.1 STAGE 1 ACTIONS 2.3.2 ASSURANCES 2.3.3 DATA GATHERING, MONITORING, AND FOCUSED RESEARCH 2.3.4 PROGRAM LINKAGES 2.3.5 GOVERNANCE ACTIONS	2-11 2-13 2-14 2-15
3.	Determination of Geographic Zones	3-1 3-2
	3.2 URBAN ZONES	1-5





SE	CTIO	PAG	ЗE
4.	Agric	cultural Water Use Management and Efficiency Improvements	
	.,,	The state of the s	-2
	4.2	GENERAL STATE-WIDE ASSUMPTIONS 4	-5
	4.3	DISCUSSION OF ON-FARM AND DISTRICT EFFICIENCY IMPROVEMENTS 4	-6
		4.3.1 Improving On-Farm Irrigation Efficiency 4	
		4.3.2 Water Delivery Improvements by Water Suppliers	
	4.4	IRRECOVERABLE VS. RECOVERABLE LOSSES 4-	13
	4.5	HYDROLOGIC INTERCONNECTIONS	16
	4.6	ASSESSING BENEFITS FROM A BASIN-WIDE VIEW 4-2	20
	4.7	ESTIMATING AGRICULTURAL WATER CONSERVATION POTENTIAL 4-7	21
	7.7	4.7.1 Input Data Necessary to Develop Estimates	
		4.7.2 Assumptions Used to Interpret and Analyze Data	
		4.7.3 Conservation Estimates: No Action Alternative vs. CALFED	٠.
		Solution and Farm-Level vs. District-Level Savings	33
	4.8	REGIONAL REDUCTION ESTIMATES	35
		4.8.1 AG1 - Sacramento River	35
		4.8.2 AG2 - Delta	
		4.8.3 AG3 - Westside San Joaquin River 4-:	
		4.8.4 AG4 - Eastside San Joaquin River	
		4.8.5 AG5 - Tulare Lake	
		4.8.6 AG6 - San Francisco Bay 4-	
		4.8.7 AG7 - Central Coast	
		4.8.8 AG8 - South Coast	49
		4.8.9 AG9 - Colorado River	51
	4.9	SUMMARY OF ESTIMATED AGRICULTURAL CONSERVATION POTENTIAL . 4-	54
	4.10	ESTIMATED COST OF EFFICIENCY IMPROVEMENTS 4-	56
		4.10.1 Cost of Reducing Applied Water vs. Cost of Real Water Savings 4-	56
		4.10.2 Estimated On-Farm Efficiency Improvement Costs 4-	
		4.10.3 Estimated District Efficiency Improvement Costs 4-	59
5.	Urba	an Water Conservation 5	5-1
	5.1	SUMMARY OF FINDINGS	5-1
٠	5.2	GENERAL STATE-WIDE ASSUMPTIONS	5-4
	5.3	SPECIFIC STATE-WIDE ASSUMPTIONS	5-5
		5.3.1 Urban Per-Capita Water Use	5-6



SECTION PAGE		
	5.4	ESTIMATING URBAN WATER CONSERVATION POTENTIAL5-95.4.1 Residential Indoor Conservation5-95.4.2 Urban Landscape Conservation5-125.4.3 Interior Commercial, Industrial, and Institutional Conservation5-175.4.4 Water Delivery System Loss and Leakage Reduction5-21
	5.5	IRRECOVERABLE LOSSES VS. RECOVERABLE LOSSES 5-24
		REGIONAL CONSERVATION ESTIMATES 5-25 5.6.1 UR1 - Sacramento River 5-26 5.6.2 UR2 - Eastside San Joaquin River 5-29 5.6.3 UR3 - Tulare Lake 5-32 5.6.4 UR4 - San Francisco Bay 5-35 5.6.5 UR5 - Central Coast 5-38 5.6.6 UR6 - South Coast 5-41 5.6.7 UR7 - Colorado River 5-44
	5.7	SUMMARY OF ESTIMATED URBAN WATER CONSERVATION POTENTIAL \dots 5-47
	5.8	ESTIMATED COST OF EFFICIENCY IMPROVEMENTS5-495.8.1 Perspective of Unit Cost Analysis5-505.8.2 Limitations of Unit Cost Estimates5-505.8.3 Data Sources for Unit Cost Estimates5-50
6.		ter Recycling
	6.2	UNDERSTANDING WATER RECYCLING OPPORTUNITIES 6-3
	6.3	DETERMINING WATER RECYCLING POTENTIAL
·	6.4	PROJECTED WATER RECYCLING UNDER THE NO ACTION ALTERNATIVE 6-8 6.4.1 Supply and Demand Constraints on Potential No Action Levels 6-8 6.4.2 Available Data for Use in Estimating the No Action Alternative Level 6-10 6.4.3 Assumed Water Recycling Potential under No Action Alternative Conditions 6-12
	6.5	ADDITIONAL WATER RECYCLING AS A RESULT OF THE CALFED PROGRAM 6-14 6.5.1 Establishing an Upper Limit of Water Recycling Potential 6-14
	6.6	SUMMARY OF STATEWIDE WATER RECYCLING POTENTIAL 6-16
7.	Ref	erences 7-1
At	tachr	ATTACHMENTS nent A. Determination of Potential Agricultural Conservation Savings A-l
Attachment B. Determination of urban Landscape Water Savings from Conservation B-l		
At	tachr	nent C. Explanation and Examples of Targeted Benefits and Quantifiable Objectives C-1



LIST OF TABLES

TABLE	3
1-1 Summary of Estimated Conservation and Recycling Potential 1-7 1-2 Summary of Potential Agricultural Water Conservation 1-8 1-3 Summary of Potential Urban Water Conservation 1-9	8
1-4 Summary of Potential Urban Water Recycling	
All Agricultural Regions	
4-1 1995 Normalized Agricultural Water Use Data Received from DWR 4-23	
4-2 Losses Calculated from Input Data Received from DWR	
4-3 Range of Leaching Requirement Volumes	
4-5 Remaining Conservable Losses	
Sacramento River Region	
4-6a Total Potential Reduction of Application	
4-6b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-6a)	
Delta Region	
4-7a Total Potential Reduction of Application	
4-7b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-7a)	
Westside San Joaquin River Region	
4-8a Total Potential Reduction of Application 4-40	
4-8b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-8a)	
4-8c Recovered Losses with Potential for Rerouting Flows (Subset of 4-8a) 4-40)
Eastside San Joaquin River Region	
4-9a Total Potential Reduction of Application	
4-9b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-9a)	
Tulare Lake Region	
4-10a Total Potential Reduction of Application 4-4-	
4-10b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-10a)	
4-10c Recovered Losses with Potential for Rerouting Flows (Subset of 4-10a)	4
San Francisco Bay Region	_
4-11a Total Potential Reduction of Application	
4-11b Potential for Recovering Currently Irrecoverable Losses (Subset of 4-11a)	



IABLE	s re	AGE
4-12a 4-12b	Al Coast Region Total Potential Reduction of Application	-48
4-13a 4-13b	Coast Region 4 Total Potential Reduction of Application 4 Potential for Recovering Currently Irrecoverable Losses (Subset of 4-13a) 4 Recovered Losses with Potential for Rerouting Flows (Subset of 4-13a) 4	-50
4-14a 4-14b	Ado River Region Total Potential Reduction of Application	-52
All Ur 4-15 4-16 4-17 4-18 4-19	Total Potential Reduction of Application 4 Potential for Recovering Currently Irrecoverable Losses (Subset of 4-15) 4 Recovered Losses with Potential for Rerouting Flows (Subset of 4-15) 4 Range of Annual Costs to Achieve On-Farm Efficiency of 85% 4 Estimated District Efficiency Improvement Costs (\$/yr) 4	l-55 l-55 l-58
5-1 5-2 5-3 5-4 5-5	Revised Best Management Practices in the Urban MOU (September 1997) DWR's Base and Projected Regional Urban Per-Capita Water Use Urban Landscaped Area (acres)	5-7 5-12
5-6 5-7a	Percentage of Urban Per-Capita Use Assumed Levels of System Distribution Losses (Percent of Total Demand) Assumed Distribution of Landscaped Acreage among ET _o Factors for the Sacramento River Region (%)	5-23
5-7b	Potential Conservation of Existing Losses (Including Irrecoverable Loss) for the Sacramento River Region (TAF/Year)	
5-7c 5-8a	Potential Conservation of Irrecoverable Losses (Available for Reallocation) for the Sacramento River Region (TAF/Year)	5-28
5-8b	for the Eastside San Joaquin River Region (%)	
5-8c	for the Eastside San Joaquin River Region (TAF/Year) Potential Conservation of Irrecoverable Losses (Available for Reallocation) for the Eastside San Joaquin River Region (TAF/Year)	
5 - 9a	Assumed Distribution of Landscaped Acreage among ET _o Factors for the Tulare Lake Region (%)	5-34
5-9b	Potential Conservation of Existing Losses (Including Irrecoverable Loss) for the Tulare Lake Region (TAF/Year)	•
5-9c	Potential Conservation of Irrecoverable Losses (Available for Reallocation) for the Tulare Lake Region (TAF/Year)	



TABLE	PAG	GE
5-10a	Assumed Distribution of Landscaped Acreage among ET _o Factors	
	for the San Francisco Bay Region (%) 5-	37
5-10b	Potential Conservation of Existing Losses (Including Irrecoverable Loss)	
	for the San Francisco Bay Region (TAF/Year) 5-	37
5-10c	Potential Conservation of Irrecoverable Losses (Available for Reallocation)	
	for the San Francisco Bay Region 5-	37
5-11a	Assumed Distribution of Landscaped Acreage among ET _o Factors	
	for the Central Coast Region (%) 5-	40
5-11b	Potential Conservation of Existing Losses (Including Irrecoverable Loss)	
	for the Central Coast Region (TAF/Year)	40
5-11c	Potential Conservation of Irrecoverable Losses (Available for Reallocation)	
	for the Central Coast Region (TAF/Year) 5-	40
5-12a	Assumed Distribution of Landscaped Acreage among ET _o Factors	
	for the South Coast Region (%) 5-	43
5-12b	Potential Conservation of Existing Losses (Including Irrecoverable Loss)	
	for the South Coast Region (TAF/Year)	43
5-12c	Potential Conservation of Irrecoverable Losses (Available for Reallocation)	
	for the South Coast Region (TAF/Year) 5-	43
5-13a	Assumed Distribution of Landscaped Acreage among ET _o Factors	
	for the Colorado River Region (%)	46
5-13b	Potential Conservation of Existing Losses (Including Irrecoverable Loss)	
- 10	for the Colorado River Region (TAF/Year)	46
5-13c	Potential Conservation of Irrecoverable Losses (Available for Reallocation)	4.0
- 1· A	for the Colorado River Region (TAF/Year)	46
5-14	Estimated Conservation Potential of Projected Losses (Including	47
~ 1 ~	Irrecoverable Losses) for All Urban Regions (TAF/Year) 5-	-4/
5-15	Estimated Conservation Potential of Irrecoverable Loss	47
= 1 <i>c</i>	(a Subset of Total Loss) for All Urban Regions (TAF/Year)	-4 / -5 1
5-16	Unit Cost Estimates for Various BMP Programs 5-	-51
6-1	Customers of Existing Water Recycling Projects	6-8
6-2	Cumulative Estimates of Water Recycling in 2020 (1 TAF per year) 6-	
6-3	Summary of Incremental Statewide 2020 Water Recycling Potential6-	



LIST OF FIGURES

FIGURE	
3-1	State-Wide Distribution of Applied Water Use
3-2	Agricultural Regions 3-4
3-3	Urban Regions
4-1	Potential Reduction of Application 4-3
4-2	Potential for Recovering Currently Irrecoverable Loss 4-3
4-3	Recovered Losses with Potential for Rerouting Flows 4-3
4-4	Estimated Cost to Conserve Existing Losses
4-5	Effect of Improved Distribution Uniformity on Potential Seasonal
	Irrigation Efficiency and Applied Water 4-10
4-6	Example Demand Elements
4-7	Existing Condition 4-18
4-8	Change from Figure 4-7 Resulting from On-Farm Efficiency Improvements 4-19
4-9	Example Region
5-1	Estimated Conservation Potential of Existing Losses
5-2	Estimated Conservation Potential of Irrecoverable Losses
5-3	Regional Population Distribution 5-11
6-1	Supply/Demand Timing Difference
	Increments of Existing and Anticipated Water Recycling 6-13

